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ENTOMOLOGICAL NEWS

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Vol. LII No. 2

CONTENTS

Westfall, Jr.—Notes on Florida Odonata 31

Pate—A Synonymical Note on Crabro (Blepharipus) davidsoni Sandhouse (Hymenoptera, Sphecidae: Pemphilidini) 34

Cresson—New Genera and Species of North American Ephydridae (Diptera) 35

Blake—Ants Preying on Termites (Hymen.: Formicidae; Isoptera: Rhinotermitidae) 38

Jones—Futher Notes on Snail-collecting Aphis-lion Larva (Neuroptera: Chrysopidae) 39

Fox—A New Opisodasys from Idaho (Siphonaptera: Dolichopsyllidae) . 45

Abbott—Modification of the Behavior of Dragonfly Nymphs with Excised Labia (Odonata) 47

Freeman—A New Species of Amblyscirtes from Texas (Lepidoptera, Rhopalocera, Hesperiidae) 50

Hayes—A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata 52

Current Entomological Literature 56

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ENTOMOLOGICAL NEWS

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Notes on Florida Odonata.

By M. J. WESTFALL, JR., Baker Museum, Rollins College, Winter Park, Florida.

(Continued from page 18)

TRAMEA LACERATA. While at Sanibel from December 27, 1939, to January 1, 1940, I saw two mating pairs and one single male of *T. lacerata*. The single specimen remained around the camp for two days and could have been collected if the sling shot had not broken. After having collected this species during the summer in North Carolina, there was no difficulty in identifying it in the field, as the general black coloration is very distinct.

ARGIA BIPUNCTULATA. This species had been very uncommon in our collection until the Spring of 1939. During the previous Spring I found a few at a roadside ditch in Orange County and collected 17 specimens on April 24, 1938. On May 13, 1939, over a hundred specimens, both male and female, were taken in a marshy area surrounding a very small pond which was nearly dry and not more than fifty feet across. Later many more were seen in the same place. In another similar locality about ten miles distant they were also found on May 14, but only a few were seen. Spaghnum moss seemed to be characteristic of the localities where this species occurred.

ARGIA TIBIALIS. In central Florida this damselfly has been very rare in our experience. We have collected only one male in this vicinity, this being taken April 4, 1937, in Seminole County. In Nassau County, however, it was one of the commonest of the Zygoptera in the summer of 1939, being common everywhere I collected.

ENALLAGMA DURUM. On the flood plains of the St. John's River many of these large *Enallagmas* have been collected. For this part of the state, this is our only locality record except for a single male which I collected on a lake in Winter Park. In May, 1939, I visited the above mentioned plains and found *E.*

durum very common on a large Indian mound. There was a strong breeze blowing and they were found around thorn bushes which grew on the mound, and stayed on the side away from the wind. By going from one thorn bush to another more than a hundred of these Enallagmas were collected in a short time, one swing of the net catching three of them on several occasions.

E. LAURENTI. In the late afternoon of November 15, 1939, a friend and I collected *E. laurenti* on a Winter Park lake from a canoe, using swatters almost entirely. These damsels were so common on the lily pads that four times as I struck at one another appeared so that two were taken at one swat. In a little over an hour we took 90 specimens, all but one of which were males.

E. SULCATUM. A number of collectors have been quite delighted to receive this species from us. Certainly it is one of our commonest Enallagmas here, since in an afternoon it is no task to collect over a hundred around one small lake while collecting various other species.

E. POLLUTUM and SIGNATUM. We have found since the paper on "Odonata at Winter Park, Florida," by E. M. Davis and J. A. Fluno was published in 1938, that our common *Enallagma* here is *E. pollutum*. Around the lakes and on the Wekiwa River they are abundant most of the year. Only about five specimens of *signatum* have been taken here. In Nassau County, a little more than 150 miles north of us, this situation seems to be reversed, and while catching several hundred *signatum* which fairly swarmed over the water at Boggy Creek and elsewhere, very few specimens of *pollutum* were taken.

E. DUBIUM. Also in Nassau County while making a swoop for an *E. weewa*, a male of *E. dubium* came along just in time to be caught in the net. On June 7, 1940, I collected three more males at this same station. On September 11, 1940, a number of males were collected, as well as four mating pairs. Females were found just emerging. On the previous day I stopped at Satilla Creek in Bacon County, Georgia, where I

had taken a pair of *dubium* a year earlier. At about 9:30 A. M., I began searching for this species. About an hour later the males began to appear, but were not collected. Then about noon the females began appearing, and the pairs in tandem began alighting on floating vegetation where the females deposited the eggs. Sixteen pairs were quite easily taken. The place where this species was found was along the roadside ditch into which Satilla Creek backs. The creek is bordered by a swampy area with a number of cypress trees in sight. The water is quite deep and dark.

E. CONCISUM. This brilliant red and black damselfly has been uncommon here in the past, but was collected at almost every lake visited in Central Florida during the Spring and Fall of 1939. Certainly it was far from being uncommon, especially at the lakes with dead grass extending out into the water for some distance. They seemed to like to stay on this grass as far from the shore as possible, so that one usually waded in the water to collect them. Some were also collected in Nassau County.

E. WEEWA. In March, 1935, one male of this species was collected on the Wekiwa River by Mr. E. M. Davis. Then I took another male in the same locality in May, 1939. No other specimens were taken by us until September 13, 1939, when I found them very abundant at certain points in Nassau County. They were first found at a small stream about five miles south of the Florida-Georgia state line. Also I collected them at a stream on the Nassau-Duval County line. Over 100 specimens, male and female, were taken in a short time. Three males were also collected in the same place on June 7, 1940. The streams where *E. weewa* was so abundant were small, flowing through low woods, which were overflowed by high water. The bottom was sandy, and the water quite dark, forming deep pools in some places. Over these pools *E. weewa* hovered as if motionless, then moved leisurely up and down the extent of the pool, hesitating here and there in mid-air. *E. cardenium* was present and at first was confused with *weewa*, but soon could be distinguished from the latter by the heavier build of the body and different flight. I believe *E. weewa* may be more

common on the Wekiwa than the two records indicate, but that the few individuals are lost in the host of *cardenium*.

TELEALLAGMA (ENALLAGMA) DAECKII. We have never taken this species in central or southern Florida, but on June 7, 1940, I collected nine mating pairs in Nassau County. They were all taken at one station, in a grassy area at the edge of a creek which was almost dry.

ISCHNURA KELLICOTTI. With a swatter this species is taken in large numbers on the local lakes, where it flies from one lily pad to another with a quick, nervous movement unlike that of any other of the Zygoptera with which I am familiar. Almost every lake with lily pads had its share of them during the Spring and Fall of 1939, males, and both homochromatic and heterochromatic females. In a couple hours to collect a hundred specimens of *I. kellicotti,* together with additional specimens of other species, was not a difficult task with a swatter at one lake where I collected.

A Synonymical Note on Crabro (Blepharipus) davidsoni Sandhouse (Hymenoptera, Sphecidae: Pemphilidini).

During a recent visit to the Museum of Comparative Zoölogy at Cambridge, Mr. Nathan Banks called my attention to a species he described in 1921 as *Blepharipus parkeri* (Ann. Ent. Soc. Amer., XIV, p. 17), and inquired if it was not the same as that which Miss Grace A. Sandhouse named *Crabro* (*Blepharipus*) *davidsoni* in 1938 (Ann. Ent. Soc. Amer., XXXI, p. 1). Comparison of the type of Banks' *parkeri,* described from a series of females taken at Lexington, Massachusetts, with material of *Crabro* (*Blepharipus*) *davidsoni,* indicates that the two are indubitably one and the same species. Miss Sandhouse's name must therefore be recorded as a synonym of Banks' earlier *Blepharipus parkeri. Crossocerus* (*Blepharipus*) *parkeri* (Banks), which nests in old stumps and rotting logs, provisioning its galleries therein with a diverse assortment of leafhoppers, is a rather common and widely distributed form throughout the New England, Middle Atlantic, and North Central states. Davidson, for whom Miss Sandhouse named the species, and Landis presented an excellent account of its biology in 1938 (Ann. Ent. Soc. Amer., XXXI, pp. 5-8).—V. S. L. PATE, Cornell University.

New Genera and Species of North American Ephydridae (Diptera).

By Ezra T. Cresson, Jr., Associate Curator, Dept. of Insects, The Academy of Natural Sciences of Philadelphia.

Discocerina flavipes new species.

Whether this is a variety or subspecies of *obscurella,* or a distinct species, is difficult to determine at present. Its similarity to the Neotropical *nitidiventris* Hendel, the narrow-cheek form of *obscurella,* is apparent, differing only, it seems, in having the legs entirely yellow. In all the material I have seen of *obscurella* from North America, the femora are dark with at most their apices showing some dilution. In the present form the legs, including the coxae, are entirely yellow, although the femora may show some infuscation on the posterior surfaces. In other respects the characters are those of that form of *obscurella* with narrow parafacies and cheeks.

Very similar to *obscurella* but the legs mostly yellow; parafacies very narrow and conspicuously pale and show little or no dilatation ventrad. Tergite V of the male seems to be no more shining than IV and is sometimes not at all shining.

Type.— ♂ ; Bakersfield, California, September 4, 1898; [A. N. S. P., no. 6607][1]. *Paratypes.*—2 ♂ , 1 ♀ ; with same data.

HELAEOMYIA new genus.

Genotype: *Psilopa petrolei* Coquillett, 1898.

This interesting insect, the "Petroleum fly," cannot well be retained in *Psilopa,* nor will it more comfortably go in *Mimapsilopa* Cresson nor *Clasiopella* Hendel.

The face is somewhat gently convex and bifoveate, with two rather stout facials on each side, occupying the lower third of facial profile. The antennal spine is short and the third segment but slightly elongate and not conoid.

Helaeomyia californica new species.

Very similar to the European *Psilopa nitidula* (Fallen) in the color pattern of the legs, but the strong general setation and the strong second facial, places it near *Psilopa dimidiata* (Cresson), another member of the genus.

[1] This material was given me by Dr. C. W. Woodworth of the University of California, in 1908.

Fore legs entirely black; antennae black with base of third segment slightly diluted. Yellow: apices of mid and hind femora, entire mid and hind tibiae and their tarsi except apices. Halteres white. Wing slightly dusky with some veins pale; posterior crossvein distinctly clouded. Shining, without any metallic reflections.

Setation strongly developed. Head broader than high; distinctly higher than long. Fronto-facial profile rather straight, oblique from anterior ocellus to mid face, with vertex rounded; Frons about .6 width of head, twice as broad as long; ocellars about as far apart as are the posterior ocelli; frontorbital aligned with frontal and well removed mesad. Face about .3 width of head, scarcely twice as long as broad; rather strongly convex but not gibbous in profile; foveal sulci slightly indicated; upper facial almost at mid profile, cruciate; second bristle one-half as long; one to two setae ventrad. Cheek about as broad as third antennal segment; buccal very long. Antennal spine as long as third segment; arista with six hairs.

Mesonotal setulae rather distinctly seriated; prescutellar rectangle, quadrate. Scutellum flat. Abdomen elongate-ovate; tergite V of male not longer than IV; genital segment well developed.

Fore coxae with weak lateral marginal setae; fore femur minutely serrulated on antero-flexor margin. Vein II but slightly curving into costa; second costal section slightly longer than third.

Length, 2 mm.

Type.—Male; Davis, CALIFORNIA; June 9, 1936; (R. M. Bohart; sweeping lawn grass); [A. N. S. P., no. 6608][2]. *Paratypes.*—1 female; with same data. 1 ♀; Eldridge, Sonoma County, California; October 25, 1915; (J. A. Kusche).

MIMAPSILOPA new genus.

Genotype: *Clasiopella metatarsata* Cresson, 1939.

Much like the Indo-Malayan *Clasiopella* Hendel, 1914, in the form of the antennae, but the arrangement of the facials simulates that of *Helaeomyia* Cresson and in this respect approaches *Leptopsilopa*.

Strongly setose species with long antannal spine and conoid third segment. Face distinctly convex medianly, the facials well separated and occupying the lower half or three-fifths of

[2] This type was placed in the Collection of the Academy by Dr. A. L. Melander.

the facial profile.

Hydrellia bergi new species.

Very similar to *H. subnitens* Cresson, 1931 in possessing such a conspicuous genital segment, but it has the legs including the tarsi, entirely black.

Black, including antennae and tarsi; palpi and genital segment, orange or yellow. Halteres lemon yellow. Wings with black veins.

Frons almost opaque black, its areas but slightly differentiated. Face sericeous, yellow to golden; lunule more whitish; cheeks and occiput cinereous. Mesonotum including humeri and notopleura and scutellum, black with very sparse gray or brownish vestitun , almost shining; pleura cinerous especially ventrad but becon ing darker dorsad and on metanotum. Abdomen opaque black, becoming more shining and sparsely einerous laterad and apicad; ventral lobes cinereous. Legs somewhat cinereous

Head scarcely broader than high. Frons strongly transverse; ocellars rather weak. Face more than one-fourth width of head, about twice as long as broad, evenly convex in profile, not definitely carinate; facial series of about six fine bristles, extend well dorsad; parafacies linear almost to postbucca. Cheeks about as broad as third antennal segment. Arista with about six hairs.

Mesonotal bristles and setulae rather well developed and the latter not numerous; antesutural dorsocentral about as strong as postsutural one with an intermediate seta, and a second postsutural dorsocentral sometimes well developed. Abdomen ovate; tergites III to V of male long, subequal in length, the latter trigonal; genital segment large, always visible, the large pale protegen being most conspicuous.

Legs slender with rather strong setation. Wings elongate, with costa II not much longer than III.

Length, 2.2 mm.

Type.—Male; Nigger Creek, Cheboygan County, MICHIGAN; June 27, 1940; (C. C. Berg); [U. S. N. M.]. *Paratypes.*—1 ♂ ; 1 ♀ ; Douglas Lake, Cheboygan Co., Michigan; July 5, 1940; (C. C. Berg). 1 ♀ ; Cheboygan County, Michigan, June 25, 1940; (C. C. Berg).

Hydrellia johnsoni new species.

Very similar to *H. tibialis* Cresson, 1917, but entirely opaque

to subopaque. The frons uniformly opaque, almost velvety-black, but the mesofrons sometimes slightly differentiated in extreme dorsal aspect. Antennae entirely opaque black. Mesonotum, scutellum and abdomen concolorous, almost truly opaque, with tendency to gray or brownish; pleura more cinereous, as are also the coxae. Second costal section slightly longer than third.

Type.—Male; New Mill Pond, Mt. Desert, MAINE; July 25, 1935; (William Procter); [Acad. Nat. Sci. Phila., no. 6609].[3] *Paratypes.*—8 ♂, 6 ♀; with same data.

Ants Preying on Termites (Hymen.: Formicidae; Isoptera: Rhinotermitidae).

In spite of the ease with which the capture of swarming termites by ants might, supposedly, be observed, there seems to be only one record extant for North America This is of an unnamed species taken in Louisiana by *Iridomyrmex humilis.*

This spring at Lincoln, Massachusetts, I was able to observe the following six ants taking alates of *Reticulitermes flavipes*: *Crematogaster lineolata, Aphaenogaster fulva acquia, Lasius niger alienus* var. *americanus, Formica rufa integra, F. neogagates,* and *F. pallidefulva nitidiventris.* This is, so far, the roll of termitharpactic ants in North America.

Wheeler (1936, Proc. Amer. Acad. Arts Sci., 71: 159-243) has excellently summarized the ecological relations of ants to termites. On pp. 178 and 179 he distinguishes five relationships: (1) termitharpagy or predation, (2) cleptobiosis or theft of termite prey from termitharpactic ants, which is really an ant to ant relationship, (3) lestobiosis or theft of termite brood by ants, (4) plesiobiosis or utilization of termitaries by ants, (5) termitoxeny or friendly residence in the termite-inhabited part of the termitary. Termitharpagy has been considered and cleptobiosis is not yet recorded for this continent. Wheeler lists four North American termitolestic ants. His fourth category is represented in North America by, at least, an occasional colony of *Crematogaster lineolata* and probably of *Camponotus castaneus americanus.* Termitoxenic ants are not known in the New World.—CHARLES H. BLAKE, Massachusetts Institute of Technology, Cambridge, Mass.

[3] The type of this species has been placed in the Academy's Collection by Mr. Procter.

Further Notes on the Snail-collecting Aphis-lion Larva (Neuroptera: Chrysopidae).

By David T. Jones, M.S., Ph.D., Associate Professor Zoölogy, University of Utah.

Identification, Distribution and Snails Carried.

Recently Dr. Roger C. Smith of Kansas State College, has examined the wing-venation of the snail-collecting aphis-lion, the larva of which has been previously described (Jones, 1929). He has tentatively identified it as *Nodita virginica* (Fitch). The specimen was collected two miles north of Bloomington, Indiana, but was in the pupal stage. After some time the adult emerged and the wings were mounted. These were later photographed by Calvin A. Richins of the University of Utah.

In addition to the above, I am indebted to the following for aid in the study of this species: Prof. H. R. Eggleston, Dr. R. G. Guthrie, Roy Ash, Ralph Alexander, and Paul Crone of Marietta College, Ohio; Adrienne Satterfield (now Mrs. Huston Newman) of West Union, Ohio; Dr. Fernandus Payne and Dr. A. C. Kinsey of Indiana University; Dr. Carl J. Drake and Dr. E. R. Becker of Iowa State College; Dr. R. V. Chamberlin and Dr. Don M. Rees of the University of Utah; and the officials of the Smithsonian Division of the Library of Congress, Washington, D. C.

Historically, the first mention that I have found of such a snail-carrying aphis-lion larva is that of Banks (1905) who erroneously placed it in the Hemerobiid, rather than in the Chrysopid family, as Smith (1926) later confirms. No locality record was given. I quote this first mention by Banks. "The larvae of *Hemerobius* appear to be much less known than allied forms; I have not bred any, but a larva given me by Mr. Schwarz probably belongs to this genus; it has a broader head, a shorter body than *Chrysopa;* and the lateral processes of the thorax are very long; this specimen was taken among fallen leaves and carried the empty shells of several small molluscs." Smith (1926) lists no snail-carrying larvae in his very fine discussion of trash-carrying Chrysopid larvae. The author (1929) described the external features of the larva now

under consideration, giving two localities: Vinton County, Ohio, approximately seven miles west of Albany, which is about twelve miles east of McArthur; and Squaw Hollow, near Marietta, Ohio. The numbers, unreported therein, were from these localities respectively: five, which were preserved; and one, which escaped. Subsequent to this publication one more living specimen was taken at Squaw Hollow. Observations have recently been made (Archer, 1938) on a similar Chrysopid, perhaps not the same species, in North Carolina and Alabama. He found only four specimens, one from each of the following four localities: Hayesville, North Carolina; Robbinsville Road in the northwest of Macon County, North Carolina; Clay, Jefferson County, Alabama; and Fort Payne, DeKalb County, Alabama. Archer reports the following species of snails carried: *Retinella indentata paucilirata, Retinella indentata carolinensis wetherbyi, Polygyra rugeli* juveniles, *Hawaiia minuscula, Euconulus sterkii, Euconulus chersinus,* and *Vertigo gouldii.* Two insect crania were also listed. As this paragraph contains all the literature resulting from a search of over ten years, it is evident that the literature is as meager, as the specimens are rare.*

During this time, however, the following locality records have accumulated for this species: Athens County, Ohio, midway between Torch and Coolville, five live specimens and two dead specimens; Meigs County, Ohio, two miles northeast of Rock Springs, near Chester, one live specimen; Morgan County, Ohio, on Turkey Run, one mile west of Stockport, one pupal case with snails intact, from which the adult insect had emerged; Adams County, Ohio, at Hill's Fork on the Panhandle Road, one living specimen; and Bloomington, Indiana, two live specimens, and one pupa from which the adult emerged, the wings of which are mentioned above.

The snails carried on the Ohio and Indiana specimens are of the following species: *Punctum pygmaeum* (Drap.), *Euconulus*

* Since this paper was submitted, Dr. Roger C. Smith has called attention to my overlooking the article by Gordon K. MacMillan. January, 1939, A snail. "taxi." Naut. Vol. 52, No. 3, pp. 94-95. He thinks that the specimens Mr. MacMillan has are "unquestionably Chrysopid" rather than Hemerobiid.

fulvus (Müller) *Striatura milium* (Morse); *Carychium exiguum* (Say), *Strobilops labyrinthica* (Say), and *Cochlicopa lubrica* (Müller). The first two seem to be favorites, as they are chosen far more often than the proportion in which these species occur in the natural fauna. Fragments of insect skeletons are also often used.

Behavior, Locomotion, Tropisms and Feeding.

The following observations on behavior chiefly of the Athens County specimens are submitted. Animals mechanically prodded "play possum", recovering in from ten to fifteen seconds if undisturbed. In walking there is a peculiar "feeling" or exploratory movement every few steps by the piercing spears. The animals at room temperature attained the following speeds in walking for thirty second periods: 11 cm. (including stops), 10 cm. (including stops), 16 cm., 16 cm., and 16 cm. The last three were non-stop promenades. While the leg action is ordinary (the first and third femora on one side moving in the same direction, while the second on the same side is moving in the opposite direction), they have a "hitching" stride. The spears can be approximated, and frequently are, when the animal stops. The animal stops "jeep-like", with head down and flattened against the table, the hind legs elevated thus raising the abdomen.

When turned over on their backs, they somersault to regain the upright position instead of turning sidewise. Sometimes they somersault spears first. At other times they recover by placing the last pair of legs down first and then flopping over.

They dislike excess moisture. They prefer a rather dry habitat of dead leaves. They choose dry instead of wet or moist surfaces. When placed in the light they turn and travel in the other direction. The more intense the light, the faster they travel, seeking darkness or at least shade. They respond negatively to heat, avoiding the warm dry hand or finger. They travel with equal facility on all inclines. They travel as easily vertically downward as vertically upward. When a vertical plane is placed at right angles to their course, they go up over it, rather than crawling along the junction of the plane with the table. In this they appear to be negatively thigmotropic,

unlike the positively thigmotropic trash-carrying Chrysopid larvae reported by Smith (1926). However, under certain circumstances, there is positive thigmotropism. They tend to wedge into crevices. Also they are very uncomfortable when divested of their cloak of shells, as described below. Smith found this also to be true with his trash-carriers, none of which are mentioned as snail-carriers.

One evening Dr. Guthrie, Roy Ash, and the author, carefully pulled the snails off the backs of two specimens and placed them in dirt containing many *Strobilops labyrinthica* and other small snails from the Lawrence Church region, Washington County, Ohio. As soon as they found themselves divested of their cloaks, they became frantic, rushing around and seizing the first objects available. One secured a lump of dirt, one *Carychium,* and one *Euconulus* and fixed them on its back. The other secured a large juvenile shell of *Cochlicopa lubrica* and a piece of dirt for its new cloak. After fastening these first objects on their backs, they behaved more leisurely. The next morning, however, they were so overloaded with small snails that each could walk only with difficulty.

At this time the one *Cochlicopa* and the *Euconulus* mentioned above were seen to be living but they were withdrawn within their shells. This observation was made under a binocular, without removing the snails from the backs of the "snail-lions". The burdens of snails of each larva suspiciously and gradually disappeared during the next few days, after which most of the shells, including the two mentioned above, were found to be empty. These suspicions were confirmed later, both at Marietta College and at Indiana University, when living insects were seen to remove living snails from their burden, thrust the long sucking spears within the aperture into the body of the snail. The snails soon were deflated, much as the ordinary aphis-lions deflate plant lice. These observations change our concept of the burden. It is a "pantry" as well as a "cloak" and a "graveyard". However, the last hardly applies, for after the feast, the shell was more often discarded than replaced on the back, especially if a fresh supply of small snails were available.

Fixation of Shells and Hibernation.

It is very interesting to watch a larva "fix" a snail on its back. The larva seizes the snail shell between the curved sucking spears, as one would pick up an object with pincers. Both abdomen and head are elevated, by raising the third and first pairs of legs respectively, while the mesothoracic region is lowered, by widely spreading the second pair of legs. This allows the head to be thrown straight back and the abdomen to be elevated, at times almost to the vertical. The shell still clasped by the sucking-spear pincers is placed among the hooked hairs on the back, and worked back-and-forth only for a very short time, after which it sticks. The animal is so small, and the process completed so quickly, that it is difficult to observe with hand lens or binocular. Moreover, the animal goes through the process rarely while being watched, and never when you would like to have it thus perform. If the shells after "fixation" are removed and examined under the binocular, fine silk-like strands can be observed to be plastered over their surface. I think that spinnerets on the tip of the elevated abdomen secrete the semi-fluid silk, which quickly dries on the shell and elsewhere hardens to form strands, which when the shell is worked back-and-forth, engage the hooked hairs on the back. However, I have yet to observe the silk being secreted. The whole process of "fixing" a shell can be completed in less than thirty seconds. The thoracic pedicels, the bristles of which are not hooked, serve as a "hay-rack" to support the overhanging portions of the burden. These have been previously described in detail (Jones, 1929). Some of the larger snails have been observed to escape from the cloak of the Squaw Hollow specimen. They continued to live quite normally, outliving the insect.

Attempts to raise the larvae in captivity have all resulted in eventual failure, though some have been kept for several weeks in a jar filled partially with dry leaves, screened over the top. Such a jar kept during the winter indoors at room temperature yielded the following observations at Marietta College. A drop of water occasionally had to be inserted to relieve excessive

dryness. It was cautiously avoided, however, by the larvae which would crawl back among the dry leaves. Excessive humidity is to be avoided, as moulds tend to accumulate and the larvae die. In the latter part of November the larvae curl the edges of the leaves and hibernate. This is probably much later than hibernation under natural conditions as the room was quite warm. I uncoiled the leaf a few times and found they were using little or no silk in the construction of their "nest". As they coiled the leaves tighter finally, I decided to let them alone until Spring. Then I found nothing by fragments of the pupae and of wings too shattered for identification. Also some white oval eggs were present, but were so dry and brittle that they shattered. At Indiana University the successful emergence of the adult from the pupal case occurred so early in the morning that it was unobserved. Shortly after its emergence I found it on the underside of the screen covering the jar. The body of the adult was still soft, moist, and light-colored. So eager was I to secure the wings for venation-study that I killed the creature before the body attained maturity of color and rigidity.

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JONES, DAVID T. 1929. A snail-collecting aphis-lion larva. A preliminary study of external features. Marietta Coll. Research Public., Vol. 1, No. 1, 9 pp., 3 plates. The Science Press, Lancaster, Penn. (Yet obtainable from the author, 818 East 5th St., Vinton, Iowa or from Prof. H. R. Eggleston, Marietta College, Marietta, Ohio.)

SMITH, ROGER C. 1926. The trash-carrying habit of certain lace wing larvae. Sci. Monthly, Vol. 23, pp. 265-267.

A New Opisodasys from Idaho (Siphonaptera: Dolichopsyllidae).

By Irving Fox, Washington, D. C.

The following new species of *Opisodasys* Jordan (1933, p. 72) is named in honor of Dr. W. L. Jellison, who has recently (1939) redescribed the other known species of the genus. In that paper and in another recently published by Jordan (1939, p. 316), the male of *O. robustus* (Jordan) is described, and is shown to be the same as that of *O. spatiosus* I. Fox (1940, p. 65). Hence the latter name falls as a synonym of *O. robustus.*

Through the courtesy of the authorities of the United States National Museum, the writer has had the opportunity to study the collections in their charge which include determined specimens of *O. enoplus* (Rothschild) and *O. robustus,* and type material of the following species: *O. pseudarctomys* (Baker), male and female; *O. keeni* (Baker), male and two females; and *O. vesperalis* (Jordan), male and female. Since specimens of all the known species of the genus have been available for study, it has been possible to devise a key to aid in the determination of the males. The type species of the genus is *Ceratophyllus vesperalis* Jordan (1929, p. 28), by original designation.

Key to the Species of Opisodasys Jordan (males only).

1. Sternal plate VIII broad basally, truncate distally, *O. jellisoni,* n. sp.
   Sternal plate VIII narrow basally, not truncate distally..2
2. Process of clasper bifurcate 3
   Process of clasper not bifurcate.....4
3. Lobes of process of clasper subequal....*O. pseudarctomys*
   Posterior lobe of process much shorter than anterior, *O. vesperalis*
4. Uppermost spiniform bristle of movable finger elbowed near base, not straight, apex directed upward..*O. robustus*
   Uppermost spiniform bristle of movable finger not elbowed, straight or with apex directed downward.....5
5. Sternal plate VIII with an apical bristle.....*O. keeni*
   Sternal plate VIII without an apical bristle....*O. enoplus*

Opisodasys jellisoni, n. sp. (Figs. 1, 2, 3.).

♂. Preantennal region of head with two rows of bristles; upper row consisting of seven bristles, lower row of three much longer ones. Post-antennal region with three bristles, in addition to a marginal row of five. Labial palpus almost reaching to apex of fore coxa, acuminate distally. Pronotal comb consisting of about 21 spines. Mesopleural suture with one bristle, mesepimeron with three bristles. Supraepisternum with one bristle, infraepisternum with three bristles; metepimeron with two bristles. *Modified segments.*—Movable finger, process of clasper and sternal plate VIII as shown in Fig. 1. Penis long and slender, spring short not completing a turn.

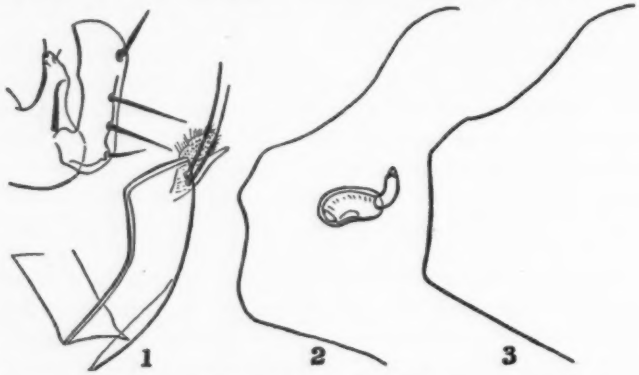

Fig. 1. *Opisodasys jellisoni*, n. sp., process of clasper, movable finger and sternal plate VIII of male.

Fig. 2. *Idem.* receptaculum seminis and sternal plate VII of female allotype.

Fig. 3. *Idem*, sternal plate VII of female paratype.

♀. Chaetotaxy of head and thorax not well shown by specimens available. Bristles of upper preantennal row reduced, some of them absent. Labial palpus not acuminate distally. Mesepisternum and mesepimeron each with four bristles. Supraepisternum with one bristle; metepimeron with three bristles. Sternal plate VII showing variation in depth of sinus. In the holotype the sternal plate VII has the shape shown in Fig. 2; while in a paratype it has the shape shown in Fig. 3.

Type host and type locality.—Flying squirrel, *Glaucomys sabrinus bangsi* at Deer Park, Boise, Idaho.

Type material.—Male holotype and female allotype from *Glaucomys sabrinus bangsi* at Deer Park, Boise, IDAHO, collected December 15-18, 1939, by W. H. Marshall; in the United States National Museum. *Type.*—U. S. N. M. Cat. No. 54259. Male and female paratypes bearing the same data in the Author's private collection.

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FOX, IRVING. 1940. Notes on North American Dolichopsyllid Siphonaptera, Wash. Ent. Soc. Proc. 42: 64-68, illus.

JELLISON, WILLIAM L. 1939. *Opisodasys* Jordan 1933, a genus of Siphonaptera. Jour. Parasitol. 25: 413-420, illus.

JORDAN, KARL. 1929. Notes on North American fleas. Novitates Zool. 35: 28-39, illus.

ID. 1933. A survey of the classification of the American species of *Ceratophyllus s. lat.* Novitates Zool. 39: 70-79.

ID. 1939. On some Nearctic Siphonaptera. Novitates Zool. 41: 316-320, illus.

Modification of the Behavior of Dragonfly Nymphs with Excised Labia (Odonata).

By CYRIL E. ABBOTT, Harding College, Searcy, Arkansas.

About fifteen years ago certain experiments carried on with the nymphs of *Anax* and *Aeschna* established the fact that those insects are capable of modifying their activities to the extent that they will learn to come to the experimenter for food.

Recently it occurred to me that it might be of interest to perform similar experiments, using instead of normal specimens, those from which the labia had been removed. Unfortunately the relatively active Aeschnids were not obtainable, and it was necessary to use the more sluggish Gomphids and Libellulids instead. Yet, even with these, the results of the experiments exceeded expectations.

Each of eleven specimens was treated in the following manner: a looped thread was slipped over the labium until it reached the point where the organ was attached to the head; the thread was drawn tight, ligating the labium proximally;

after which the useless organ was excised just distad of the ligature. This treatment seemed to have no seriously injurious effect upon the nymphs; for, although some of them did die shortly after amputation, so also did some untreated specimens; on the other hand, some of the amputated specimens lived long after the experiments were terminated. Each experimental animal was kept in a preparation dish, containing, in addition to water, a little sand. Once each day an attempt was made to feed the insects by presenting each of them with a bit of meat impaled on the end of a dissecting needle. The materials varied somewhat: raw frog muscle was used, also hamburger, and once liver from a rat.

As in the previous experiments with Aeschnids, one could detect in the behavior of these animals a period of indifference, followed by orienting movements of the head, and, finally a tendency to follow the food about the dish. But what was curiously different from the behavior of normal specimens was the fact that some of these nymphs actually learned to take food from the needle with the mandibles!

A detailed account of the experiment follows. Of the eleven specimens amputated at the beginning of the experiment, three died within two days of treatment; three of the remaining insects gave no response at any time; and one specimen responded once, six days after amputation. The responses of the remaining four specimens, since they are of special interest, are given in detail.

No. III, a Libellulid, gave no response until the third day after amputation, when it accepted food placed in its mandibles. On the sixth day it made as if to seize the food; and on the seventh day it swam toward the food, "lunged" at it, and finally grasped this food with its mandibles. This behavior was repeated on the ninth day, rather feebly, however. The animal was dead on the tenth day.

No. IV, a Gomphid, made slight movements toward the food the day following amputation. It gave no other response until the eighth day, when it followed the food about the dish. On the ninth day this nymph not only followed the food, but

finally succeeded in taking some of it with the mandibles. It died on the tenth day after amputation.

No. V, a Gomphid, gave slight positive responses the day after amputation. Until the sixth day it gave no other definite response, although it invariably took food placed in its mandibles. On the sixth day it attempted to seize the food, which it followed for some distance; on the seventh day it succeeded in obtaining some of the food. On the eighth day it only partially responded, but again on the ninth day it duplicated its behavior on the seventh. The experiment was terminated on the tenth day, as most of the other specimens had died.

No. VII, a Gomphid, took food placed in its mandibles the day after amputation, but not until the sixth day did it swim to the needle and take food of its own accord. This it repeated on the seventh day. On the eighth day only feeble responses were given, and the experiment was discontinued.

In considering these results it is well to remember that only a few specimens were used, that of these, only four gave the responses described, and that the responses were, in part, what one might expect to find in untreated animals. Nevertheless, it seems significant that *some* of the nymphs did respond as they did; for this implies that others are capable of doing likewise. It is the more remarkable when one considers the sluggish habits of these myopic, mud-inhabiting forms, lacking the decisive movements and greater visual powers of the Aeschnids. Consider that the labium of the dragonfly nymph is used, not only for seizing prey, but for holding that prey while it is being consumed. The mandibles are poorly adapted to holding food, and they are placed very inconveniently for seizing it.

In view of these considerations, and without implying that the modification exhibits any *intelligence* on the part of the nymph, I feel bound to maintain that it does indicate adaptive powers which are not easily explained on a purely mechanistic basis. The nymph is far from being the mechanically automatic thing some biologists claim. Moreover, the modification involves a modification of the organism *as a whole*. No theory of reflex action *alone* can account for the behavior of the ex-

cised nymph which swims to food, thrusts its head *over* that food, and employs its mandibles in a manner for which they are poorly fitted, and, under normal conditions, would never be employed.

A New Species of Amblyscirtes from Texas (Lepidoptera, Rhopalocera, Hesperiidae).

By H. A. Freeman, Lancaster, Texas.

Amblyscirtes belli n. sp.

♂. *Upperside.* Primaries, black with some fulvous overscaling toward the base and inner margin; three sordid white subapical spots, the top and bottom ones longer than the middle one; a small sordid white spot in interspace Cu_1 directly below the bottom subapical spot; a V-shaped, sordid white spot in interspace Cu_2 with the bars of the V pointing toward the outer margin of the wings, the upper bar twice as long as the lower one. The spots in some specimens slightly fulvous.

Secondaries. Black with a few scattered fulvous hairs toward the base and inner margin of the wings.

Underside. Primaries. Black, somewhat lighter than above except at the base, fulvous overscaling toward the costal margin and apex. The five spots on the upper surface reappear, more distinctly, and in addition there are three spots making a curved connection between the last subapical spot and the small spot in interspace Cu_1, with the curvature toward the outer margin below the apex.

Secondaries. Black, nearly completely overscaled with gray in some specimens, in others the overscaling is restricted to the outer margin and base of the wings. Two indistinct, vestigial spots near the costa; one minute discal spot; a submesial row of connected spots forming an irregular line, bordered on the inside by dark scales and on the outside by lighter ones. All spots are dark hoary gray.

Body above black with some long gray hairs on the thorax and anterior part of the abdomen; beneath grayish; sides of the abdomen black, gray scales forming lines between the segments; palpi light gray, with a few scattered black scales; antennae black, ringed with sordid white; club black above, lighter beneath. Fringes of both wings sordid white between the veins black at the ends of the veins.

♀. Similar to the male but with reduced maculation.

Expanse: Male, 24-29 mm., average size 26 mm.; female 23-32 mm., average size 27 mm.

Described from 109 specimens, 68 males and 41 females, collected by the author at Lancaster and two miles west of Vickery, Dallas County, TEXAS, during April, May, June and August of 1940.

This species was placed as undescribed by Mr. E. L. Bell, American Museum of Natural History, New York, and in his honor I take great pleasure in naming it.

Holotype male and *allotype* female in the collection of the author. *Paratypes* are being placed in the following collections, three pairs, American Museum of Natural History, New York; one pair, United States National Museum, Washington, D. C.; one pair, Carnegie Museum, Pittsburgh, Pennsylvania; one pair, Field Museum, Chicago, Illinois; one pair, The Academy of Natural Sciences of Philadelphia; one pair, collection of Mr. F. Martin Brown, Colorado Springs, Colorado; one pair, collection of Mr. Lowell Hulbirt, Glendora, California; and one pair in the collection of Dr. A. W. Lindsey, Granville, Ohio. The remaining 87 paratypes will remain for the present in the collection of the author for determination purposes.

Belli more closely resembles *celia* Skinner than any of the other species of *Amblyscirtes*. In preparing this description *belli* was compared with 37 specimens of *celia* contained in the author's collection and the following differences were noted.

1. Although a dark species, *celia* is lighter than *belli*. None of the specimens in the type series were as light as any of the 37 specimens of *celia*.

2. *Celia* often has a spot near the end of the cell on the upper surface of the primaries. *Belli* never has a spot in that region.

3. *Celia* is more completely overscaled with lighter scales on the under surface of both wings than is *belli*.

4. The spots on the under surface of the secondaries of *celia* are white, contrasting with the brown rather plainly, whereas *belli* has dark hoary gray spots that are inconspicuous; in some specimens they are nearly absent.

A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata[1].

By Wm. P. Hayes.

The study of immature aquatic insects has probably been given more attention than terrestrial forms for the reason that in most instances aquatic insects can be more easily reared and with such rearings has come a greater knowledge of the growing stages. As pointed out in Part I[2] of this work the writer is attempting to make available for investigators the literature containing tables or keys for the identification of the developmental stages of various insect orders. The following references have been gathered for use in class work devoted to the taxonomy of immature insects and many have been tried and found to have distinct value. It is realized that the list is probably not complete and the writer would welcome having his attention called to additional citations.

Among aquatic nymphs (naiads) of the three orders Odonata, Plecoptera and Ephemerida, the Odonata have been given more intensive study by a greater number of students than the Plecoptera or Ephemerida. This perhaps can be attributed to the greater appeal to collectors that is possessed by the adults. Hence more study of younger stages and, as a result, we find more keys for their identification than we find in the other two orders.

Attention should be called to the works of Lamb (1924) and Nevin (1929 and 1930) in which we are supplied with *keys to the instars* of the three species representing both suborders—the Anisoptera and Zygoptera. From these it is apparent that we have scarcely made a beginning of our study of these forms. Moreover Calvert (1934, Proc. Amer. Philosophical Soc. Vol. 73, pp. 63-64) in a study of growth rates and larval development in the genus Anax begins his summary of this work with the following highly significant statement, "Different indi-

[1] Contribution No. 200 from the laboratories of the Department of Entomology of the University of Illinois.

[2] A Bibliography of Keys for the Identification of Immature Insects, Part I—Diptera. Ent. News, Vol. 49: 246-251, 1938; 50: 5-10, 76-82, 1939.

viduals of *Anax junius*, a common North American species, and different parts of the same individual grow at different rates. This renders an *exact* definition of the characteristics of any one of the thirteen larval instars impossible. Nevertheless it is believed that the age of a given larva may be determined within an approximation of one or two instars. All possible characters should be taken into consideration in making such determinations." This condition perhaps occurs in all Odonata and probably in immature insects of all orders. It is an important consideration that must be kept in mind in using our available keys. So many of our key couplets are concerned with size, and from the above quotation it is apparent that statements of size mean very little, unless qualified by the words "when full grown" and even then how many of us are able to say when a larva or nymph is fully developed?

I asked Dr. Calvert to add any references known to him which I had not included in my original draft. He has complied with my request and about half the number here listed have been furnished by him.

ANDER, KJELL. 1926. Beiträge zur Kenntniss der schwedischen Odonaten 1. 2. *Ent. Tids.* 47 (1); 31-42, 14 figs., Taf. 2. (*Agrion hastulatum, lunulatum, armatum, puella;* no keys, but interspecific comparisons.)

ID. 1929. Ueber die Nymphe von *Mesogomphus hageni* Selys. *Konowia* 8 (2): 159-162, 4 figs. (No keys, but comparisons with allied forms.)

AUSSERER, CARLO. 1869. Neurotteri tirolesi colla diagnosi di tutti i generi europei. Parte I. Pseudo-Neurotteri. *Annuario Soc. Nat. Modena* 4: 71-156, Tav. viii-ix. Also separately paged 1-88. (Analytic table of genera of larvae facing p. 84 (16).

BARBICHE (Abbé). 1884-87. Faune synoptique des Odonates ou Libellules de la Lorraine. *Bull. Soc. Hist. Nat. Metz* (2) 16: 11-20, 17: 85-163. Also paged separately 1-93, Metz Imprimerie Even Freres 1887 (on cover), Impr. Verronnais (Fischer Succ.) 1883 (on title-page). (Key to genera of larvae pp. 87-89 (15-17).

BARNARD, K. H. 1937. Notes on dragonflies of the S. W. Cape with descriptions of the nymphs and of new species. *Ann.*

S. Afr. Mus. 32: 169-260, 32 figs. (Key to genera of nymphs pp. 182-3.)

BRAUER, F. u. LÖW, F. 1857. Neuroptera austriaca. Die im Erzherzogthum Oesterreich bis jetzt aufgefundenen Neuropteren u. s. w. Wien, Carl Gerold's Sohn. Pp. i-xxiii, 1-80, 5 Taf. (Synopsis of genera of Odonate larvae, pp. xiv-xvi.)

BRUES, C. T., and MELANDER, A. L. 1932. Classification of insects. *Bull. Mus. Comp. Zool.* 73. Cambridge, Mass., 672 pp., (Key to families pp. 164-167).

BYERS, C. F. 1927. The nymph of *Libellula incesta* and a key for the separation of the known nymphs of the genus *Libellula*. *Ent. News* 38: 113-115. 1927. (Key to species pp. 114-115).

ID. 1927. Notes on some American dragonfly nymphs (Anisoptera). *Jour. N. Y. Ent. Soc.*, 35: 65-74, (Key to species of *Anax*, pp. 68-69 and to species of *Tramea* p. 73).

ID. 1930. A contribution to the knowledge of Florida Odonata. *University of Florida Publ. Biol. Sci.* Series 1 (1); 1-327, 19 figs., 11 pls. (Key to spp. of nymphs, pp. 34-39, table for *Enallagma* spp., pp. 194-195).

ID. 1936. The immature form of *Brachymesia gravida*, with notes on the taxonomy of the group (Libellulidae). *Ent. News* 47: 35-37, 3 figs., 60-64. (Key to genera of Corduliinae and Libellulinae, pp. 60-64).

ID. 1937. A review of the dragon-flies of the genera *Neurocordulia* and *Platycordulia*. *Misc. Publ. No. 36. Mus. of Zool., Univ. Mich.*, pp. 1-36. 8 pls. (Key to species, p. 9).

ID. 1940? A study of the dragonflies of the genus *Progomphus* (*Gomphoides*) with a description of a new species. *Proc. Florida Acad. Sci.* 4: 19-85, tables, 1 graph, 6 pls. 1939. (Key to 3 spp. of nymphs, pp. 58-59.)

CABOT, L. 1872. The Immature State of the Odonata. *Ill. Cat. Mus. of Comp. Zool.*, No. V (*Mem.* of same 2) Part I. Subf. Gomphina, pp. 1-17, Pls. I-III. 1881. Part II. Subf. Aeschnina, *Mem.* of same 8 (1): pp. 35-39. 1890. Part III. Subf. Cordulina, *Mem.* of same 17 (1); pp. 37-41.

CALVERT, P. P. 1893. Catalogue of Odonata (Dragonflies)

of the vicinity of Philadelphia, with an introduction to the study of this group of insects. *Trans. Amer. Ent. Soc.*, 20: 152a-272. (Key to genera of nymphs, pp. 225-227).

Id. 1928. Report on Odonata, including notes on some internal organs of the larvae collected by the Barbados-Antigua Expedition from the University of Iowa in 1918. *Univ. Iowa Stud. Nat. Hist.* 12 (2): 1-54, Pls. I-V. (Generic keys to four Libelluline genera, pp. 15, 18; tables to spp. of *Tramea* and *Erythemis* pp. 29, 34.)

Id. 1934. The rates of growth, larval development and seasonal distribution of dragon-flies of the genus *Anax* Aeshnidae). *Proc. Amer. Philosophical Soc.*, 73 (1): 1-70, 4 Pls. (Key to species of *Anax*, pp. 46-47.)

Cowley, J. 1933. The larvae of the European species of *Gomphus* Leach. *Ent. Mo. Mag.* 69: 251-252, pl. vii.

Djakonov, A. M. 1926. [Our Libellulidae—Keys for the identification of Libellulidae and their nymphs.] In Russian. Exkursion Fauna des Leningraders Gouvernements. Moscow and Leningrade 72 pp. 8° (Paper not seen).

Dufour, Leon. 1852. Études anatomiques et physiologiques, et Observations sur les larves des libellules. *Ann. Sci. Nat.* (3) *Zool.* 17 (2): 65-110, Pls. 3-5. (Statement of generic and specific characters of *Aeschna* 3 spp., *Libellula* 2 spp., *Calopterix* 1 sp., *Agrion* 1 sp. pp. 67-73.)

Fraser, F. C. 1925. The true position of the genera *Orogomphus* and *Chlorogomphus* as demonstrated by a study of the larva of *O. atkinsoni* and *O. campioni* and by a comparison of the latter with the larva of *Anotogaster nipalensis*. *Rec. Ind. Mus.* 27 (5): 423-429, pls. ix, x.

Id. 1933-36. The fauna of British India, including Ceylon and Burma. Taylor & Francis, London. Odonata. Vols. I-III. (No keys to larvae, but characters of the larvae of some of the larger groups are given.)

(To be continued.)

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. **The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :**

Papers published in the Entomological News are not listed.
No. 150 in this issue is VI Congr. Internac. Ent. Madrid.

GENERAL.—Andre & Lamy.—See under Arachnida. **Anon.**—Damage to scientific institutions in London. [68] 92: 548. **Balduf, W. V.**—More ambush bug prey records (Hemiptera). [19] 35: 161-169. **Blatchley, W. S.**—Obituary by J. S. Wade. [10] 42: 204-208. **de la Torre-Bueno, J. R.**—The perfect description. [19] 35: 175. **Fernald, H. T.**—Comments on C. B. Williams' paper, "On 'type' specimens." [7] 33: 625. **Fuller, H. S.**—Black-flies bite woodchuck. [19] 35: 155. **Gibson, A.**—Controlling insects from the air—a review of work conducted in Canada. [150] 2: 867-872, ill. **Kellogg, Vernon Lyman.**—Obituary, portrait and bibliography by R. W. Doane. [7] 33: 599-607. **Le Cerf, F.**—"Aberrations" et nomenclature. [150] 2: 943-950. **Metalnikov & Metalnikov.**—Utilisation des microbes dans la lutte contre les insectes nuisibles. [150] 2: 555-566. **Poche, F.**—Stabilitat der wissenschaftlichen Namen oder Stabilitat der Nomenklaturregeln. [150] 2: 951-957. **Quilis Perez, M.**—Calculo de las fajas isocondicionales y de las lineas de maximo desarrollo para los insectos [150] 2: 447-454, ill. Influencia de los factores climaticos en el calculo de los ciclos biologicos de los insectos. [150] 2: 621-633. **Reichenow, E.**—Consideraciones sobre el desarrollo de las relaciones ecologicas entre los artopodos y los protozoos por ellos transmitidos. [150] 2: 501-508. **Sandhouse, Grace A.**—In Memoriam, obituary and bibliography by Cushman and Russell. [10] 42: 187-189, ill. **Scotland, M. B.**—Review

and summary of studies of insects associated with Lemna minor. [6] 48: 319-333, ill. **Scott, H.**—General and zoogeographical considerations regarding the Coleoptera associated with giant lobelias and senecios in eastern Africa. [150] 2: 443-446. **de Seabra, A. F.**—Considerations sur l'entomologie du ble. [150] 2: 607-610. **Swank. G. R.**—See under Coleoptera. **Tragardh, I.**—Some problems of modern forest entomology. [150] 2: 887-890. **Uvarov, B. P.**—Locust as an international problem. [150] 2: 535-543, ill. **Weyrauch, W.**—Observaciones entomologicas en el valle de Chanchamayo y en Tingo Maria. [Bol. Mus. Hist. Nat. "Javier Prado"] 4: 346-359. **Williams, C. B.**—On "type" specimens. [7] 33: 621-624.

ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.—A modification of the feeding reaction of Aeschna (Odonata). [19] 35: 171. **Bliss, C. I.**—The relation between exposure time, concentration and toxicity in experiments in insecticides. [7] 33: 721-766. **Finlayson & Green.**—A note on the effect of certain foods upon fecundity and longevity in Microcryptus basizonus (Hymen.). [4] 72: 236-238. **Nisikawa, Y.**—The respiration of the pupa of Bombyx mori in and outside of cocoon. [Trans. Kansai Ent. Soc.] 10: 27-32.

ARACHNIDA AND MYRIOPODA.—Andre & Lamy.—Coloration tegumentaire, ressemblance protectrice et mimetisme chez les Acariens. [150] 2: 413-439. **Beier, M.**—Zur Phylogenie der troglobionten Pseudoscorpione. [150] 2: 519-527. **Pierce, W. D.**—A rare myriapod from Anacapa Island, compared with two Texas species. [38] 158-171, ill. **Senevet, G.**—Quelques Ixodides de la Guyane francaise: especes nouvelles d'Ixodes et d'Amblyomma. [150] 2: 891-898, ill.

THE SMALLER ORDERS OF INSECTS.—Berner, L.—Ovoviviparous mayflies in Florida [Pro. Fla. Acad. Sci.] 4: 280. **Byers, C. F.**—A study of the dragonflies of the genus Progomphus (Gomphoides) with a description of a new species. [Pro. Fla. Acad. Sci.] 4: 19-85, ill. **Carpenter, F. M.**—A revision of the Nearctic Hemerobiidae, Berothidae, Sisyridae, Polystoechotidae and Dilaridae (Neuroptera). [Proc. Amer. Acad. A. & S.] 74: 193-280, ill. (k*). **Cope, O. B.**—The morphology of Psocus confraternus (Psocid.). [Microent.] 5: 91-115, ill. **Davis, C.**—Family classification of the order Embioptera. [7] 33: 677-682. (k). **Eglin, W.**—Die Neuropteren der umgebung von Basel.

[Rev. Suisse Zool.] 47: 243-251. **Kennedy, C. H.**—Palaemnema joanetta, a new dragonfly from Panama (Odonata). [7] 33: 626-628, ill. **Milne & Milne.**—A n. sp. of Rhyacophila described from metamorphotypes (Trichop.). [19] 35: 153-155, ill. **Pieltain, C. B.**—Sobre el parasitismo del Eoxenos laboulbenei. [121] 1: 304-305. **Ross, E. S.**—A revision of the Embioptera of North America. [7] 33: 629-676, ill. (k*). **Spieth. H. T.**—Studies on the biology of the Ephemeroptera, II.—The nuptial flight. [6] 48: 379-390.

ORTHOPTERA.—Handford, R. H.—Egg deposits of a type not usually produced by Melanoplus m. mexicanus in Manitoba. [4] 72: 235. **Rehn, J. A. G.**—A new genus of Tropinotine locusts from Brazil (Acridid.). [Notulae Nat.] No. 66: 9 pp., ill. **Spencer, G. J.**—The effect of hailstorms on grasshoppers. [4] 72: 233-234.

HEMIPTERA.—Balduf, W. V.—See under General. **Ball & Beamer.**—A revision of the genus Athysanella and some related genera (Cicadellid.) [Univ. Kansas Sci. Bull.] 26: 5-82, ill. (k*). **Craig, F. W.**—The periodical cicada in West Virginia. [W. Va. Univ. Bull.] 14: 39-43, ill. **Davidson & DeLong.**—Studies of the gen. Empoasca (Cicadell.), VII: Six n. spp. from Mexico. [7] 33: 608-611, ill. **de la Torre-Bueno, J. R.**—Biological notes on Arizona Heteroptera. [19] 35: 157. Tollius vanduzeei n. sp., with notes on the genn. Tollius and Stachyocnemus (Alydidae). [19] 35: 159-161, ill. **Doering. K. C.**—A contribution to the taxonomy of the subfamily Issinae in America north of Mexico (Fulgoridae). [Univ. Kansas Sci. Bull.] 26: 83-167, ill. (k*). **Drake, C. J.**—Dos nuevas especies del genero Blissus de la Argentina. [Notas Mus. de la Plata] 5: 223-226, ill. **Lindsay, D. R.**—The genus Norvellina. [Univ. Kansas Sci. Bull.] 26: 169-213, ill. (k). **Oman, P. W.**—Three n. spp. of Deltocephalus (Cicadell.). [10] 42: 201-203, ill. **Osborn, H.**—The Membracidae of Ohio. [Ohio State Univ. Studies] Bull. 37: 51-101, ill. (k).

LEPIDOPTERA.—Brown, Gabriel & Goodson.—New forms and spp. of the gen. Catastictia. [19] 35: 170-171, (S). **Busck, A.**—Notes on North American Microlepidoptera with descriptions of new genera and species. [38] 39: 87-98, ill. **Clarke, J. F. G.**—The European genus Morophaga in North America. (Tineidae). [38] 39: 114-117, ill. **Comstock, J. A.**—Notes on the life history of Aseptis perfumosa. [38] 39: 104-105, ill. The early stages of Trachea

fumeola, [38] 39: 106-107, ill. Notes on the early stages of Euphydryas gilletti. [38] 39: 111-113, ill. **Dammers, C. M.**—Euphydras chalcedona. [38] 39: 123-125. **Dethier, V. G.**—The final stages of Polites mystic. [38] 39: 108-110, ill. **Evans, W. H.**—The type of the gen. Pyrropyge (Hesperiid). [6] 48: 405-411. **Fernald, H. T.**—The monarch butterfly (Danaus menippe) in Florida. [Pro. Fla. Acad. Sci.] 4: 252-254. **Field, W. D.**—Distribution notes and comments upon a collection of Mexican Lepidoptera. [Univ. Kansas Sci. Bull.] 26: 339-354. **Fletcher, T. B.**—A new California plume-moth (Alucitidae). [38] 39: 99-103. **Heinrich, C.**—Correction of a misused generic name (Olethreut.). [4] 72: 242-243, (*). **Kane, H. B.**—An American Silkworm. [Nat. Hist.] 47: 19-23, ill. **Klots, A. B.**—A new Brenthis from Alaska (Nymphal.). [6] 48: 413-414. **McDunnough, J.**—A new Pseudexentera from hickory (Eucosmid.). [4] 72: 243-244, ill. **Medlar, W. P.**—Notes on the life histories of two western North American moths. [38] 39: 118-122, ill. **Sweetman, H. L.**—The migration of a Pierid butterfly in Texas. [19] 35: 173-174.

DIPTERA.—Erikson, G. E.—See under Hymenoptera. **Fairchild, G. B.**—Notes on Tabanidae from Panama: II.—The gen. Dichelacera and related genn. [7] 33: 683-700, ill. (k*). Notes on the Simuliidae of Panama. [7] 33: 701-719, ill. (k*). **Haeussler, G. J.**—See under Hymenoptera. **Haseman & McLane.**—The history and biology of the juniper midge (Contarinia juniperina). [7] 33: 612-614, ill. **Hinman, E. H.**—The problem of races of Anopheles quadrimaculatus in the United States. [150] 2: 937-942. **Huckett, H. C.**—The North American spp. of the genn. Leucophora and Proboscimyia (Muscid.). [6] 48: 335-365, ill. (k*). **Martini, E.**—Beziehungen der Anopheles maculipennis Rassen zur Umwelt und zur Malarialage. [150] 2: 903-909. **Steyskal, G.**—Additional specimens of Lasia purpurata (Acrocerid.). [19] 35: 158. **Vargas, L.**—El indice maxilar en algunos Anopheles americanos. [Rev. Inst. de Salubrid. y Enferm. Trop., Mexico] 1: 275-289.

COLEOPTERA.—Balthasar, V.—Neue Phanaeus-Arten. [Folia Zool. et Hydrobiol.] 9: 238-247. Eine vorstudie zur monographie der gattung Canthon. [Folia Zool. et Hydrobiol.] 9: 179-238. **Bruch, C.**—Miscelaneas entomologicas. [Notas Mus. de la Plata] 5: 193-206, ill. **Darlington, P. J.**—Stomus pumicatus in America (Carabid.). [4] 72: 252.

Fiedler, C.—Die sudamerikanischen arten der gattung Acalles (Cryptorhynchid.). [Mitt. Munchner Ent. Gesell.] 30: 820-842. (*). **Henderson, L. S.**—A revision of the genus Listronotus (Curculionid.). [Univ. Kansas Sci. Bull.] 26: 215-337, ill. (k*). **Jeannel, R.**—Sur la distribution geographique des Catopidae. [150] 2: 493-499, ill. **Linsley, E. G.**—A reclassification of the tribe Obriini of Leconte (Cerambyc.). [6] 48: 367-377, (k*). **Mansour, K.**—The classification of the Coleoptera and post-embryological research. [150] 2: 405-411, ill. **Saylor, L. W.**—Synoptic revision of the beetle genn. Cotalpa and Paracotalpa of the U. S. with description of a new subgen. (Scarab.). [10] 42: 190-200, ill. (k*). **Soraci, F. A.**—Distribution in New Jersey of (Myllocerus) Corigetus? castaneus (Curculion.). [6] 48: 318. **Swank, G. R.**—A method of mounting small beetle genitalia. [4] 72: 238-240, ill. **Ting, P. C.**—Revisional notes concerned with Cimbocera and related genera. (Curculionid.). [38] 39: 128-157, ill. (*). **Wenzel, R. L.**—A genus of histerid beetles new to the United States. [91] 30: 516-519, ill. **Zariquiey Alvarez, R.**—Observaciones sobre la copula en los Bathysciinae (Silphid.). [150] 2: 441-442.

HYMENOPTERA.—Brown, R. W.—The comb of a wasp nest from the upper cretaceous of Utah. [Amer. Jour. Sci.] 239: 54-56, ill. **Clausen, C. P.**—The oviposition habits of the Eucharidae. [91] 30: 504-516, ill. **Cockerell, T. D. A.**—Bees obtained by the Los Angeles Museum-Biological Survey. [38] 39: 172. **Erikson, G. E.**—The Tipulid prey of a Crabronid. [19] 35: 172. **Finlayson & Green.**—See under Anatomy. **Gaul, A. T.**—A note on the biology of Polistiphaga arvalis (Ichneumon.). [4] 72: 240-242. A note on rearing the brood of Polistes fuscatus (Vesp.). [6] 48: 391-393. **Haeussler, G. J.**—Parasites of the Oriental fruit moth in Japan and Chosen and their introduction into the United States. [U. S. Dept. Agric.] Tech. Bull. 728: 62 pp., ill. **Michener, C. D.**—A new carpenter bee from the Great Basin Region. (Xylocopidae). [38] 39: 126-127. **Pate, V. S. L.**—Three new Nyssonine wasps from the southwestern United States (Sphecidae). [Notulae Nat.] No. 63: 7 pp. **Rau, Phil.**—Co-operative nest-founding by the wasp Polistes annularis. [7] 33: 617-620.

SPECIAL NOTICES.—Entomophagous insects. By C. P. Clausen. McGraw-Hill. 688 pp., ill.

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